AN AEROBIC TREATMENT FOR DUDH SAGAR DAIRY, MAHESANA

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Key words : Anaerobic treatment, Anaerobic Baffled Reactor, Organic loading rate, COD removal, Dairy effluent.

ABSTRACT

The present study has been undertaken to evaluate the performance efficiency of the ABR (anaerobic baffled reactor) in treating effluent of dairy industries under anaerobic condition. The laboratory model of ABR of 12 liters capacity was fabricated by acrylic sheet material provided with gas space partition, was used to study the anaerobic treat-ability of dairy effluent. The raw dairy effluent with different organic loading rate was fed into the ABR and the effluent was analyzed for COD removal and biogas production. The maximum COD removal of 91% along with 0.82 L/d biogas was observed during the experiment.

INTRODUCTION

The dairy effluent contains high organic material due to incorporation of milk and milk products. The environmental impact of these dairy effluents can be very high due to the discharge of very large amount of wastewater with a high content of organic matter and nutrients. The dairy wastewater discharged into sewers or any other water body causes pollution in the environment in different ways depending on their bio degradability and solubility. There is a rapid growth of sewage fungi within the water bodies which cause decrease in dissolved oxygen level. Occasionally the waste carries the bacteria responsible for tuberculosis like sphaerotilus natans, etc. The dairy wastewater normally characterized as follows:

1) They are mainly diluted milk or milk products.
2) Cleaning compounds and sanitizers are the major constituents of dairy wastewater.
3) The contaminants are with a high organic strength and nutrients (N, P).
4) They have high BOD5, COD and total solids. The wastewater generated in the dairy industry has BOD more than 2000 mg/L, dissolved solids of 1800 mg/L and whey has a very high COD ranging from 30000 mg/L to 40000mg/L.
5) The use of acid and alkaline cleaning compounds may cause high pH variability. All compounds of dairy wastewater are biodegradable except protein and fat.

The biological treatment system (aerobic and/or anaerobic) is being followed to treat industrial wastewaters. Aerobic treatment requires large energy consumption to produce biomass. High operation cost and disposal of large amount of sludge (incineration and as fertilizers) are the problems faced in
The laboratory scale ABR was fabricated with 6 mm thick acrylic sheet material with overall dimensions of 60 cm long, 13 cm width and a depth of 24 cm. The reactor was divided into 10 equal compartments by vertical baffles, flowing through it, the wastewater comes into contact with a large amount of biomass as it passes through the reactor and the effluent is relatively free from biological solids. The aim of this study was to evaluate treatability performance of the ABR on the dairy effluent at various organic loading conditions.

EXPERIMENTAL SETUP

The anaerobic treatment of the wastewater from the influent and effluent characteristics such as pH, feed of COD concentration. During the operation, the waste water employed in this study was collected via porthole on the top of the reactor and the daily volume was determined using the gas liquid displacement technique.

Sampling and analysis

The laboratory scale ABR was equipped with sampling ports that used for draw out the samples for analyzing. The reactor temperature at 35°C. The anaerobic treatment of the wastewater in the reactor was kept at the room temperature. The produced gas was collected via porthole on the top of the reactor and the characteristics results are shown in the Table 1.

Table 1. Organic loading rate 2.8 kg of COD/L/d

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<tr>
<th>No. of days</th>
<th>BOD influent mg/L</th>
<th>COD influent mg/L</th>
<th>pH</th>
<th>TSS influent mg/L</th>
<th>BOD effluent mg/L</th>
<th>COD effluent mg/L</th>
<th>pH</th>
<th>% of BOD removal</th>
<th>% of COD removal</th>
<th>Volume fed L/d</th>
<th>HRT in days</th>
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Table 2. Organic loading rate 4.5 kg of COD/L/d

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actor. No purges were carried out during the whole operational period of 3 months, which indicates that the excess of bio mass can be successfully removed automatically from the reactor and without any inhibition effects.

ACKNOWLEDGEMENT

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REFERENCES
